

REMARKS**1. The Amendments and the Support Therefor**

No claims have been canceled, four new claims (21-24) have been added, and no claims have been amended to leave claims 1-24 in the application. A PTO-2038 authorizing a charge for any newly-submitted claims in excess of the amount previously paid for should accompany this Response, as per 37 CFR §1.16(b)-(d), with the fee due being calculated as follows:

FEE CALCULATION

For	Already Paid	No. Extra	Rate (SMALL ENTITY)	Fee (SMALL ENTITY)
Total Claims	24 - 20 =	4	x \$9 =	\$36
Independent Claims	3 - 3 =	0	x \$42 =	\$0
Total:				\$36

No new matter has been added by the new claims, which are discussed at Section 4 below.

2. Information Disclosure Statement (Form PTO-1449)

Please note that an Information Disclosure Statement (IDS), including a form 1449 with references, was filed on March 11, 2003, but its receipt and review is not noted in the Office Action. (A duplicate copy of the PTO-1449 accompanies this Response for the Examiner's convenience.) Please verify receipt of the IDS in any future communications.

3. Section 3 of the Office Action: Rejection of Claims 1-13 and 20 under 35 USC §103(a) in view of U.S. Patent 5,836,372 to Kono, U.S. Patent 6,308,768 to Rice et al., and GB 2 276 831

Kindly reconsider the rejections. There is in fact no motivation to modify *Kono* to shear the alloy with intermeshed twin screws (as per *Rice* or GB 2 276 831). Looking to Fig. 1 of *Kono*, the alloy is thoroughly mixed in feeder 20, and is then fed to barrel 30, where the alloy is cooled, and sheared via mixer 32, to maintain the alloy in its thixotropic state (see column 3 lines 10-50). The thixotropic alloy is then fed to injection molder 40/50. Note that it is important to distinguish "mixing" and "shearing"; *mixing* merely involves stirring an alloy's components, whereas *shearing* involves agitating the alloy to such a degree that its microstructures are broken

or otherwise deformed. See, e.g., column 1 lines 24-38 of *Rice* and paragraph 5 of the present application, which note how shearing hinders dendrite formation.

It is alleged that it would be obvious to modify *Kono* to use twin intermeshing screws (as per *Rice*/GB 2 276 831) to provide good *mixing* to the thixotropic mixture. However, no ordinary artisan would in fact see any motivation to make this modification because *Kono*'s alloy is already "mixed" in the feeder 20: there is no need for further mixing. Even if further mixing was desired, *Kono* teaches the use of a well-known beater/stirrer arrangement for mixing, and thus when the references are considered objectively, one of ordinary skill would simply use the conventional arrangement taught by *Kono*. This is particularly true since both *Kono* (at column 3 lines 45-50) and *Rice* (at column 4 lines 49-58) note that any desired degree of mixing can be achieved with such conventional arrangements. In short, there is no reason to add a twin screw for the purpose of further mixing (since no further mixing is needed), and even if one did seek further mixing, there is nothing suggesting that any advantage would be obtained from the twin screw arrangement claimed by the Applicant.

If the Examiner instead means that one of ordinary skill would find it obvious to use a twin screw in *Kono* because this would result in better *shearing*, there is also no motivation here. Note from GB 2 276 831 (at the bottom of page 5) that the twin screw is used to mix seeds and herbicide (among other applications). Consider that if GB 2 276 831's twin screw did provide high shearing, it could not be used for seeds: the seeds would be pulverized into paste, and would be unusable (and GB 2 276 831 clearly intends for the seeds to be usable, else it would not mix them with herbicide). In other words, GB 2 276 831 suggests that a twin screw provides good mixing but low or no shear. But this is contrary to the objectives of the claimed invention, wherein good shear is needed. As noted in the application (e.g., at paragraph 34), a twin screw arrangement provides cyclic shear variation, with shear increasing where the screws intermesh and dropping in regions away from the intermeshing region. No references of record note any appreciation of this feature, or suggest that it would in any way be advantageous in a thixotropic casting process.

It is emphasized that the Applicant in no way disputes that thixotropic casting is known, nor that twin screw mixing is known; however, it is plainly unobvious to use a twin screw shearing arrangement in a thixotropic casting process, since there is no suggestion in the known references that twin screw shearing would in any way be beneficial (and as noted above, GB 2 276 831 plainly suggests that twin screws would not provide sufficient shear, since it uses twin screws for mixing of "delicate" materials such as seeds).

It is also notable that the use of GB 2 276 831 appears to be made in hindsight. If one steps back and places all knowledge of the claimed invention out of mind, and then asks what the collective references would suggest as an improvement to *Kono*, one might use the twin rotor arrangement of *Rice*: here, the rotor 42/43/44 is stated to provide good horizontal mixing (see column 3 lines 61-62) and the rotor 46/48 is stated to provide good vertical mixing (see column 4 lines 5-7). But there is then no objective reason to further modify this combination to use a twin screw as in GB 2 276 831 (and this combination also does not amount to the present invention). The end result is that wherever the prior art may lead one of ordinary skill, it is not seen how it would lead one to the claimed invention. Kindly withdraw the rejections.

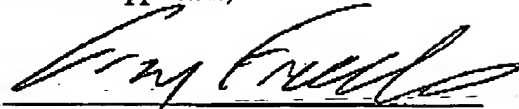
4. New Claims 21-24

New claims 21-24 find support in paragraph 36 of the application, and are believed allowable for at least the same reasons as claims 1 and 20, and additionally because no art of record teaches or suggests the recited shear rates or their utility in the methods of claims 1 and 20.

5. In Closing

If any questions regarding the application arise, please contact the undersigned attorney. Telephone calls related to this application are welcomed and encouraged. The Commissioner is authorized to charge any fees or credit any overpayments relating to this application to deposit account number 18-2055.

For the Applicant,



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ATTACHMENTS:

- PTO-2038 (\$36)
- 11 March 2003 IDS